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ABSTRACT

The developmental mathematics program described in this report is offered at Mohawk Valley Community College (New York) as a self-paced, semi-programmed sequence of units covering signed numbers and beginning algebra. The paper begins by establishing the need for such a program, explaining that in Fall 1979 it became evident that the college's traditionally taught Essentials of Arithmetic course was not meeting the needs of underprepared, unmotivated nontraditional students. After describing an unsuccessful attempt in Spring 1980 to use a semi-programmed approach, the paper examines how the current two-course sequence was designed and developed. The paper then covers the following aspects of the program: (1) requirements for instructional materials that were easily read and offered numerous exercises; (2) procedures established for student progress through the courses' units, which required students to achieve a score of 70% on unit tests before proceeding; (3) the course content of Developmental Mathematics I and II; (4) the development and use of homework workbooks, in-class worksheets, and a test bank of pretests, unit tests, and final examinations; (5) student activities and the sequencing of assignments and tests; and (6) grading and the granting of graduation credit for Developmental Mathematics II. The paper concludes with general comments about students' satisfaction with the course and the advantages and disadvantages that have been identified. (AYC)

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DEVELOPMENTAL MATHEMATICS AT MOHAWK VALLEY COMMUNITY COLLEGE

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Paper presented at the Remedial and Developmental Mathematics in College: Issues and Innovations Conference (New York, NY, April 9-11, 1981).

The Developmental Mathematics program at MVCC is a self-paced, semi-programmed curriculum covering signed-numbers and beginning algebra. The content is divided into two ten week quarters: Developmental Mathematics I-Arithmetic which carries no credit towards graduation and Developmental Mathematics II-Algebra which carries three (3) credits towards graduation in certain programs. Both courses meet five (5) days per week for fifty (50) minutes per session for ten (10) weeks. Since the programs are self-paced students may finish Developmental Mathematics I before the end of the quarter. The student generally will begin Developmental Mathematics II immediately. A typical classroom, therefore, will contain students working in both courses. Enrollments are limited to a total of twenty (20) students. Besides the instructor there is a clerk available to help correct papers, give out worksheets, tests, and so on.

History: During the Fall, 1979 quarter the instructors noted a general change in the population of the then-called Essentials of Arithmetic course. Essentials of Arithmetic was a traditionally taught three-day-per-week signed-numbers course. The students, however, were not traditional. They were, for the most part, poorly-trained, lacking in motivation, and in need of special treatment. Abilities among students varied greatly. Attendance was poor. The instructors tried to remedy the situation by offering extra "lab" hours. But

this was not enough. The students were falling far behind in their class work and could not catch up during "lab".

In the following quarter we tried a semi-programmed approach with three days of instruction and two recommended "lab" hours per week. A standard textbook (Arithmetic without Trumpets and Drums, Zuckerman) was used, assignments were made, tests given. The lab instructor was not the classroom instructor. This made it difficult to communicate individual student problems. Coordinating homework was difficult. There was general agreement among instructors that the next course, Developmental Mathematics II-Algebra, would also have to be "up-dated" to better meet the needs of the "new" student.

It was my task during Summer 1980 to redesign and develop materials for a new sequence of courses, Developmental Mathematics I-II, to allow for individual differences in learning rates. It became clear that using a standard textbook would not meet our needs. We needed small doses which were easy to read and offered plenty of problems. Retesting options would have to be offered. No student should progress to the next unit until at least a passing grade of 70 was accomplished on the previous unit. Additional worksheets would be needed. A final bank would have to be created since students would be working at their own rate. Finally, it was agreed that the instructor would cover both class and "lab" hours. Both courses were designed to meet five days per week, 50 minutes per day for

ten weeks. The instructor receives credit for 3 class hours and 2 lab hours, however, there is no real distinction between class and lab.

Developmental Mathematics I:

The course content for Developmental Mathematics I was divided into six units: whole numbers; integers-adding; integers-adding and subtracting; integers-all operations; fractions; and decimal and percents. The materials for each unit were written in easy terms with very little theory. Homework was developed for each small unit and was assembled into a loose leaf binder workbook. The sets of worksheets were developed to be given out in class for each unit. Additional worksheets were developed as well. A test bank consisting of two options for pretests, ten options for tests per unit, and five options for finals was developed.

A student progresses through the course as follows - on the first day of class each student takes a pretest to determine his/her abilities with whole numbers. If the student does not do well on the pretest the instructor assigns reading and worksheets from the first unit. Otherwise the student corrects the pretest and proceeds to take a test for a grade on the whole numbers. Only grades of 70 or better are acceptable for progressing to the next unit. No partial credit is given for any test question. If the student does not get a grade of 70 or

better, the student is assigned worksheets and continues until a grade of above 70 is achieved. Students may always retest for a higher grade and the highest grade of all the tests on the unit is recorded, not the last taken.

Beginning with the second unit and continuing thereafter the student reads, does homework and worksheets before pretesting. We use the pretests as practice tests to see if the student can draw all the material together. The tests for each unit always cover material from previous units. The final examination is comprehensive and is given when the students has completed all six units satisfactorily. There is no retest for the final examination.

Students progress through the six units at their own rate. While it is not unusual to have students complete the course in 6 weeks or less, it is also not unusual to have students complete as few as 2 units in 10 weeks. The average student will take approximately 9-10 weeks to complete the course. Grades are given at mid-term and at the end of the quarter. At mid-term we assign grades of S (satisfactory) or U (unsatisfactory). The grade is based on attendance (no more than 5 absences of 25 class periods) and progress (some forward movement must be made). Grades at the end of the quarter are A,B,C,F for those that complete the course (the grades on the 6 unit tests and final are averaged together). We do not allow D grades (it was felt that a grade of D in the course meant almost certain

failure in the next course). Students who do not complete the course in the ten weeks are given a grade of O (ongoing) or F. These two grades are based on attendance and progress. No more than 10 absences are allowed for an O. The usual withdrawal grades and incomplete are also used as appropriate.

Upon completion of Developmental Mathematics I most students immediately enroll in Developmental Mathematics II.

Developmental Mathematics II:

The course content for Developmental Mathematics II was divided into seven units: arithmetic review and beginning algebra notation; operations on algebraic expressions; division and long division; equation solving; word problems; factoring; graphs and lines. The materials are similar to the Developmental Mathematics I materials. Tests and pretests were devised. Finals were written. Unlike Developmental Mathematics I we do assign partial credit on examinations. The same system for progressing through the course is used.

General Comments:

1. The students, for the most part, like the system and do well. We have an occasional student that demands to be "taught", blackboard style. Most instructors do some blackboard work to small groups of students. Otherwise instruction takes place on a one-to-one basis. To those students that want a traditional classroom setting we suggest the evening Essentials

of Mathematics course.

2. The program has not been in place long enough to determine its statistical success. I have had students finish the second course and successfully complete the next credit-bearing course.
3. Because class size is kept small the instructor is able to "get to know" the students. The atmosphere is more relaxed and tends to reduce any "math anxiety".
4. On the negative side, it is hard for the instructor to judge progress in the student and hence some grades of O should have been F.
5. Reproduction of the text has been somewhat of a problem. We sought a low costing in-house produced text but ended with a mid-priced text.